



# Set-valued Optimization: An Introduction with Applications (Vector Optimization)

By Akhtar A. Khan, Christiane Tammer, Constantin Zălinescu

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Set-valued optimization is a vibrant and expanding branch of mathematics that deals with optimization problems where the objective map and/or the constraints maps are set-valued maps acting between certain spaces. Since set-valued maps subsumes single valued maps, set-valued optimization provides an important extension and unification of the scalar as well as the vector optimization problems. Therefore this relatively new discipline has justifiably attracted a great deal of attention in recent years. This book presents, in a unified framework, basic properties on ordering relations, solution concepts for set-valued optimization problems, a detailed description of convex set-valued maps, most recent developments in separation theorems, scalarization techniques, variational principles, tangent cones of first and higher order, sub-differential of set-valued maps, generalized derivatives of set-valued maps, sensitivity analysis, optimality conditions, duality and applications in economics among other things.

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**Set-valued Optimization: An Introduction with Applications (Vector Optimization) By Akhtar A. Khan, Christiane Tammer, Constantin Zălinescu Bibliography**

- Rank: #1189212 in Books
- Published on: 2014-10-21
- Original language: English
- Number of items: 1
- Dimensions: 9.21" h x 1.63" w x 6.14" l, .0 pounds
- Binding: Hardcover
- 765 pages

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### Review

“In this monograph, the first one entirely devoted to the subject, the authors present a unified treatment of the state of the art of most of the developments in this field. ... It is very well written and contains numerous results and examples and over 600 references. ... I wholeheartedly recommend this book to anyone interested in new trends in optimization, in particular, researchers who are interested in multiobjective/vector-optimization and its interconnection with variational analysis.” (Miguel Sama, Mathematical Reviews, December, 2015)

“The monograph contains a very large number of interesting, new or at least recent results not only in the fields of set-valued optimization together with many examples illustrating them. It is an interesting scientific resource for all researchers investigating problems of mathematical optimization. I can highly recommend it to graduate and PhD students as well as to scientists working in the fields of nonsmooth, multicriteria or set-valued optimization.” (S. Dempe, Optimization, July, 2015)

“This massive and very well-written book will probably be for many years the primary reference in set-valued optimization, the area of optimization where the objective and/or constraint functions of the considered problems are set-valued maps. ... this book will be a solid reference for everyone interested in set-valued optimization, be they graduate students or established scientists.” (Sorin-Mihai Grad, zbMATH 1308.49004, 2015)

### From the Back Cover

Set-valued optimization is a vibrant and expanding branch of mathematics that deals with optimization problems where the objective map and/or the constraints maps are set-valued maps acting between certain spaces. Since set-valued maps subsumes single valued maps, set-valued optimization provides an important extension and unification of the scalar as well as the vector optimization problems. Therefore this relatively new discipline has justifiably attracted a great deal of attention in recent years. This book presents, in a unified framework, basic properties on ordering relations, solution concepts for set-valued optimization problems, a detailed description of convex set-valued maps, most recent developments in separation theorems, scalarization techniques, variational principles, tangent cones of first and higher order, sub-differential of set-valued maps, generalized derivatives of set-valued maps, sensitivity analysis, optimality conditions, duality, and applications in economics among other things.

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